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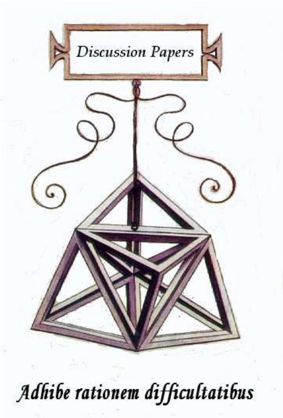

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Habits, aspirations and endogenous fertility

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Discussion Paper
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Abstract

Abstract Motivated by the increasing literature on endogenous preferences as well as on endogenous fertility, this paper investigates the implications of the interaction of the endogenous determination of the number of children with habit and aspiration formation in an OLG model. In contrast with the previous literature, we show that greater aspirations may lead to higher savings, and more interestingly, always increase the neoclassical economic growth.

Keywords Endogenous preferences; Fertility; OLG model

JEL classification J13; O41

1. Introduction

The recent economic literature has analysed both the theoretical and empirical implications of the existence of endogenous preferences, in particular those displaying habits or aspirations. For an individual with habits, utility of the current consumption depends also on his own past experience of consumption, while for an individual with aspirations, utility depends also on the consumption experience of his predecessors. This means that in any case the reference with respect to which current own consumption is compared to is given by a past level of consumption.

The implications of endogenous preferences on saving, capital accumulation and dynamic stability in overlapping generations (OLG) models have been investigated by some authors. For instance Lahiri and Puhakka (1998) study the effects of habit intensity on saving in a pure exchange economy. Wendner (2002) extends the previous work to a economy with production and capital accumulation. De la Croix (1996) and De la Croix and Michel (1999) focus on stability issues in an OLG economy with aspirations and inherited preferences. Artige et al. (2004) introduce aspirations in a two-country OLG world and show that inhabitants of one country develop consumption habits incompatible with the necessary investment in knowledge to remain the leader, thus opening the possibility for the other region to catch up and gain economic primacy. Alonso-Carrera et al. (2004) analyse the welfare properties of the competitive equilibrium with infinitely-lived individuals having both habit formation and consumption spillovers, while Alonso-Carrera et al. (2007) study the long-run effects of both habits and aspirations on the capital stock in an OLG context with bequests. Abel (2005) focuses on the optimal fiscal policy in an OLG economy when consumption externalities are present. All of them share the feature to abstract from the determination of fertility rates.

However, according to the most part of the recent literature stimulated by the new home economics (Becker, 1960), the number of children should be considered as the result of a rational choice based on economic constraints and incentives. Therefore I treat the rate of fertility as an endogenous variable, by assuming a weak form of altruism of parents towards children, according to, amongst many others, Galor and Weil (1996) and Zhang and Zhang (1998), that is people decide to have a certain number of children simply because they directly enter their utility functions as another consumption good.

In the present paper we study, in the basic OLG model (under different contexts such as a small open economy and a closed economy either with a linear technology or with a standard Cobb-Douglas production function), the implications of the interaction of the endogenous determination of the number of children with habit and aspiration formation, and we will characterise the long-run effects of both habits and aspirations on the fertility rate, the saving rate and the capital stock, and thus on the long-run income. To this end, we show that habits and aspirations have effects in accord with the previous literature when the fertility rate is exogenously given. In this case, we show, on the one hand, that an increase in habit intensity increases the amount of old-age consumption since a stronger preference for habits reduce the overall utility accruing from early consumption. As a consequence, since a higher old-age consumption can be achieved by means of an increasing saving rate, we show that the amount of savings always increases (in accord with the results of Lahiri and Pukkara, 1998, Wendner, 2002, Alonso- Carrera et al., 2007). On the other hand, an increase in aspiration intensity drives young adults to increase their current consumption, causing a reduction in savings (in line with the result popularised, for instance, by De la Croix, 1996).

However, in sharp contrast with the case of exogenous fertility, we show that when the number of children is endogenously chosen, greater aspirations cause (*i*) a reduction in the rate of fertility, (*ii*) an increase in savings, provided also that the habit intensity is sufficiently high, and, more interestingly, (*iii*) an increase in the per capita stock of capital and thus in the long-run per capita income, independently of whether savings are reduced or increased.

The intuition lying behind the previous result is the following: higher aspirations for young people imply higher young consumption, which in turn implies, owing to the presence of habits, a higher consumption reference for old people. Therefore, it follows that the higher both habits of the old people and aspirations of the young people are, the higher the saving rate to sustain the increased desired old-age consumption will be. We argue that if the number of children is treated as a consumption good and is endogenously determined, then an increase in young-adult consumption and savings as a consequence of a rise in the aspiration intensity may occur at the expense of a reduced number of children. It follows that both a higher saving rate and a lower fertility rate increase per capita income in the long run. To the extent that fertility rates are an endogenous variable instead of an exogenous one, the effect of the aspiration intensity on the long-run economic performance is, surprisingly, positive. This result is, to the best of our knowledge, a novelty in the OLG growth literature.

The paper is organised as follows. In Section 2 the model is defined and the main steady-state results as regards the cases of both exogenous and endogenous fertility are analysed and discussed, focusing on the cases of small open economy and closed economy with both linear and Cobb-Douglas technology. Section 3 makes some concluding comments.

2. The model

In this section we develop the model first with exogenous fertility and then with endogenous fertility. Moreover both a small open economy and a closed economy (at fixed prices and with a Cobb-Douglas production function) contexts are examined.

As regards the firms sector in a small open economy context, a constant-returns-to-scale production function – which is constant through time, twice continuously differentiable, strictly monotonic increasing and concave, and satisfies the Inada condition – is assumed. The output produced at time t; Y_t, is: $Y_t = G(K_t;L_t)= L_t\ g(k_t,1-l_t)$, with $k_t=K_t/N_t$, where N_t is the number of individuals in working age, K_t and $L_t=(1-l_t)N_t$ are the capital and labour employed at time t.

The economy is perfectly competitive so that production factors are paid their marginal product: $1+r_t=g'(k_t,1-l_t)$, and $w_t = g(k_t,1-l_t)-k_t g'(k_t,1-l_t)$, where $1+r_t$

is the gross rate of return on physical capital and w_t the wage rate per efficiency unit of labour. For simplicity, we may suppose that the world rental rate is fixed at a level *r*. Since the small economy allows unrestricted lending or borrowing, its rental rate is set equal to the world rental rate, *r*. Therefore, the wage rate will be treated as constant over time. Moreover, individual savings are no more relevant for determining capital and output, but only for the balance of payments.[1]

2.1. Exogenous fertility

First, we consider the case of exogenously given fertility. Therefore it is assumed that young population N_t grows at a constant rate n. Agents are assumed to belong to an overlapping generations structure with finite lifetimes, and life is separated into two periods: youth and old-age (Diamond, 1965). Individuals belonging to generation t have a homothetic and separable utility function defined over young-aged and old-aged consumption, $c_{1,t}$ and $c_{2,t+1}$, respectively, which, as usual for having more manageable solutions, is assumed to be of Cobb-Douglas-type. Each young individual supplies inelastically one unit of labour in the labour market, and receives wage income at the competitive rate w_t. During old-age agents are retired and live on the proceeds of their savings (s_t) plus the accrued interest at the rate r_{t+1}. Moreover, we suppose old individuals survive to the second period with (constant) probability $0<\pi<1$. Therefore, the existence of a perfect annuity market implies old survivors will benefit not only from their own past saving plus interest, but also from the saving plus interest of those who have deceased.

As regards habits and aspirations, we will assume that in each period individuals derive utility from the comparison of their consumption with a consumption reference. This consumption reference will be given, during young age, by the aspirations consisting in the past consumption inherited from own parents at the corresponding young age, and, during old age, will be determined by the consumption level they have reached in the previous period. Furthermore, following the most part of authors, such as, for instance, Lahiri and Puhakka (1998), Wendner (2002), De la Croix (1996), De la Croix and Michel (1999), Alonso-Carrera et al. (2004, 2007), we choose an additive formulation for the specification of the "effective" consumption.

Thus, the representative individual born at time t is faced with the following programme:

$$\max_{\{s_t\}} U_t = \ln\left(c_{1,t} - qc_{1,t-1}\right) + \pi\beta\ln\left(c_{2,t+1} - \gamma c_{1,t}\right), \tag{P}$$

subject to

$$c_{1,t} + s_t = w$$
$$c_{2,t+1} = \frac{1+r}{\pi} s_t \tag{1}$$

[1] A balance of payments analysis is beyond of the scope of the paper.

where r is the interest rate, $c_{1,t-1}$ is the past consumption inherited from own parents when they were in young age, 0<q<1 and 0<γ<1 are a measure of the intensity of aspirations and habits, respectively, and $0<\beta<1$ is the subjective discount factor.

Maximisation of programme (P) gives the following saving function:

$$s_t = \frac{\pi\left[w\left[(1+\beta\pi)\gamma + \beta(1+r)\right] - \beta q c_{1,t-1}(1+r+\gamma\pi)\right]}{(1+r+\gamma\pi)(1+\beta\pi)} \tag{2}$$

Let us define $c_{1,t-1} = h_t$ (3).

Therefore it follows that, by exploiting the young-age constraint, the dynamics of the young consumption is given by:

$$h_{t+1} = \frac{\left[w(1+r) + q\beta\pi(1+r+\gamma\pi)h_t\right]}{(1+r+\gamma\pi)(1+\beta\pi)} \tag{4}$$

We focus on the stationary state,[2] that is $c_{1,t-1} = c_{1,t} = c_1$ (or equivalently $h_{t+1} = h_t = h$), which is the following:

$$c_1 = \frac{\left[w(1+r)\right]}{(1+r+\beta\pi)(1+\beta\pi(1-q))} \tag{5}$$

By using (5), the steady state level of savings is given by:

$$s = \frac{\pi w\left[(1+\beta\pi(1-q))\gamma + \beta(1+r)(1-q)\right]}{(1+r+\gamma\pi)(1+\beta\pi(1-q))} \tag{6}$$

Analysis of the steady states of the young-age consumption (Eq. 5) and savings (Eq. 6) gives the following

Result 1. (a) The young-age consumption is increased by aspirations, while it is unaffected by habits; (b) savings are reduced by aspirations and increased by habits.

Result 1 straightforwardly follows, by deriving Eqs. (5) and (6) with respect to both habit and aspiration parameters, respectively (the derivatives are omitted here for economy of space). These findings are in accord with the previous literature and the economic intuition behind them is that briefly explained in the introduction.[3]

To sum up, focusing particularly on the role of aspirations, we have seen that greater aspirations reduce, as expected, the saving the rate.

2.2. Endogenous fertility

In this section we extend the preceding model by assuming that the number of

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[2] We are only interested here to a long-run analysis, however it is easy to see that the difference equation (4) as well as the subsequent equation (10) shows solutions converging to the unique equilibrium point.

[3] For instance, as regards the role of aspirations, de la Croix (1996, p. 91) argues that «…aspirations affect savings negatively. When aspirations are low, the adult generation has a sober lifestyle and savings are high. When aspirations are high compared with wage income, adults spend much on consumption to maintain a life standard similar to the one of their parents and their propensity to save is low."

children, n, is endogenously chosen by young individuals. As usual (e.g., Eckstein and Wolpin, 1985; Galor and Weil, 1996), we hypothesise that children enter the utility function and also that raising children requires a fixed amount $m > 0$ of resources.

Thus, the representative individual entering the working period at time t is faced with the following programme:

$$\max_{\{s_t, n_t\}} U_t = \ln\left(c_{1,t} - qc_{1,t-1}\right) + \pi\beta\ln\left(c_{2,t+1} - \gamma c_{1,t}\right) + \phi\ln(n_t)\,, \qquad \text{(P1)}$$

subject to

$$c_{1,t} + s_t = w - mn_t$$
$$c_{2,t+1} = \frac{1+r}{\pi} s_t \qquad (7)$$

Maximisation of programme (P1) gives the following fertility and saving functions:

$$n_t = \frac{\phi\left[w(1+r) - qc_{1,t-1}(1+r+\beta\pi)\right]}{m(1+\beta\pi+\phi)} \qquad (8)$$

$$s_t = \frac{\pi\left[qc_{1,t-1}(1+\beta\pi+r)\left[\phi\gamma - \beta(1+r)\right] + \beta w(1+r)\left[\gamma(1+\pi\beta) + \beta(1+r)\right]\right]}{(1+r+\gamma\pi)(1+\beta\pi+\phi)(1+r)} \qquad (9)$$

Recalling Eq. (5) and the young-age budget constraint, the dynamics of the young-age consumption becomes: $h_{t+1} = \frac{\left[w(1+r) + q(\phi+\beta\pi)(1+r+\gamma\pi)h_t\right]}{(1+r+\gamma\pi)(1+\beta\pi+\phi)}$

(10)

In this case, the steady-state young-age consumption is the following:

$$c_1 = \frac{\left[w(1+r)\right]}{(1+r+\beta\pi)(1+(\beta\pi+\phi)(1-q))}$$

(11)

By using Eq. (11), the steady state levels of savings and fertility are given respectively by:

$$s = \frac{\pi w\left[\left[1+\beta\pi(1-q)\right]\gamma + \beta(1+r)(1-q)\right]}{(1+r+\gamma\pi)\left[1+(\beta\pi+\phi)(1-q)\right]}$$

(12)

$$n = \frac{\phi w(1-q)}{m\left[1+(\beta\pi+\phi)(1-q)\right]}$$

(13)

The investigation of Eqs. (12) and (13) gives the following results:

Result 2: (1) fertility is not affected by habits; (2) aspirations reduces fertility rates.[4]

Result 3: (1) savings are positively affected by habits; (2) aspirations may

[4] Note that this result may propose a further explanation lying behind the observed dramatic drop of the fertility rates in many advanced countries, pivoting on a widespread raise of the aspirations, probably connected with phenomena such as advertising, media diffusion and so on, but this analysis is beyond of the scope of the paper.

either reduce or increase savings: in particular $\frac{\partial s}{\partial q} \gtrless 0 \Leftrightarrow \phi\gamma \gtrless \beta(1+r)$

(14)

The novelty of Result 3 is that greater aspirations may increase savings: this occurs more likely when individuals significantly discounts the future consumption, have much love for children, and habits are sufficiently high.[5] Moreover, note that if habits are absent, aspirations always reduce savings.

2.3. Closed economy at fixed prices

In a small open economy only domestic savings are decided by individuals in that installed capital depends on the international capital market. Now we relax the assumption of small open economy, supposing that in a closed economy goods as well as capital markets are cleared when the investments-savings equality holds. This leads, in the case of exogenous fertility, to: [6]

$$(1+n)k_{t+1} = s_t \tag{15}$$

Substituting out for s according to Eq. (2), the following dynamic equation for the per capita stock of capital is obtained:

$$k_{t+1} = \frac{1}{1+n}\frac{\pi\left[w_t\left[(1+\beta\pi)\gamma+\beta(1+r^e{}_{t+1})\right]-\beta q h_t(1+r^e{}_{t+1}+\gamma\pi)\right]}{(1+r^e{}_{t+1}+\gamma\pi)(1+\beta\pi)} \tag{16}$$

while the dynamic equation of the young-age consumption (Eq. 4) may be now rewritten as $h_{t+1} = \frac{\left[w_t(1+r^e{}_{t+1})+q\beta\pi(1+r^e{}_{t+1}+\gamma\pi)h_t\right]}{(1+r^e{}_{t+1}+\gamma\pi)(1+\beta\pi)}$

(17)

In such a case the behaviour of the economy is characterised by the (forward) dynamic planar system given by Eqs. (16) and (17).

In the case of endogenous fertility the market clearing condition is given by the following:

$$n_t k_{t+1} = s_t \tag{18}$$

Substituting out for s and n according to Eqs. (8) and (9), the following dynamic equation for the per capita stock of capital is obtained:

$$k_{t+1} = \frac{\pi\left[w_t(1+r^e{}_{t+1})\left[(1+\beta\pi)\gamma+\beta(1+r^e{}_{t+1})\right]+qh_t(1+r^e{}_{t+1}+\gamma\pi)\left[\phi\gamma-\beta(1+r^e{}_{t+1})\right]\right]}{\phi\left[(1+r^e{}_{t+1})(w_t-qh_t)-qh_t\gamma\pi\right]} \tag{19}$$

which jointly with (10), rewritten as $h_{t+1} = \frac{\left[w_t(1+r^e{}_{t+1})+q(\phi+\beta\pi)(1+r^e{}_{t+1}+\gamma\pi)h_t\right]}{(1+r^e{}_{t+1}+\gamma\pi)(1+\beta\pi+\phi)}$

(20),

provide the final dynamic system characterising the economy with endogenous fertility.

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[5] Note that longevity, while reduces fertility and increases savings, does not affect the role played by aspirations on savings, so that this result holds in economies with high as well as low adult mortality.

[6] The equality between current investment and lagged savings is the typical feature of the OLG model with production (Diamond, 1965) and it is this generational lag which leaves room for effects of population growth on the per capita capital.

Now, one can notice that, since, in general, under a given technology wages and interest rates depends on *k*, closed form solutions for *k* and c_1 for both dynamic systems given by Eqs. (16)-(17) and (19)-(20) are prevented. Therefore, in general we may analytically find only the partial effects of greater aspirations on k_{t+1} and h_t. This means that the long-run per capita capital and income may be determined by Eqs. (16) and (17) in the exogenous fertility case and by Eqs. (19) and (20) in the endogenous fertility case only by assuming fixed prices, owing, for instance, to a linear technology, that is $w_t = w, r^e{}_{t+1} = r$. Under this assumption we are also able to extend the results as regards savings, obtained in a small open economy, also to the long-run capital accumulation and income in a closed economy at fixed prices, as the following results shows.

Result 4*:* In the case of exogenous fertility: (a) the young-age consumption is increased by greater aspirations; (b) the per capita capital (and thus income) are reduced by greater aspirations.

Result 4 can easily be shown. Since from Eq. (17) we see that $\frac{\partial h_t}{\partial q} > 0$ the part a) is proved, and recalling the latter inequality and gathering from Eq. (16) both $\frac{\partial k_{t+1}}{\partial h_t} < 0$ and the partial derivative $\frac{\partial k_{t+1}}{\partial q} < 0$, also the part b) is proved.[7]

Result 5*:* In the case of endogenous fertility (a) the young-age consumption is increased by greater aspirations; (b) the per capita capital (and thus income) are increased by greater aspirations.

This result is easily proved: since from (20) $\frac{\partial h_t}{\partial q} > 0$ the part a) is proved, and recalling the latter inequality and easily obtaining from (19) that $\frac{\partial k_{t+1}}{\partial h_t} > 0$ and the partial derivative $\frac{\partial k_{t+1}}{\partial q} > 0$, also the part b) is proved.

As regards the economic interpretation, we observe that once again the Result 4 is in line, as the Result 1, with the conventional view of the negative role of aspirations on long-run economic performances.

In the case of endogenous fertility Result 5 overturns the conventional view. Indeed, Result 5 claims that, while the young-age consumption is always, as expected, increased, also the per capita capital and thus output are, rather surprisingly given the ambiguity of the response of savings, always increased by an increasing aspirations intensity. In such a case the economic mechanism at work is as follows: while, on the one hand, greater aspirations always

[7] Note that this proof may be equivalently obtained by substituting the equilibrium value of c_1 (Eq. 5) in Eq. (17) as regards part a), and in Eq. (16) and then evaluating the derivative of Eq. (16) with respect to *q*, as regards part b). This line of reasoning may easily be extended to the proof of the subsequent Result 5.

reduce fertility rates, on the other hand they may either increase or reduce savings (see Results 2 and 3). In the former case the per capita capital is unambiguously increased, in the latter case fertility rates are always reduced more than the reduction of savings and thus, overall, the per capita capital is increased. Therefore, in both cases aspirations are always beneficial for the long-run economic performance, independently of whether they reduce or increase savings.

Moreover, it should be noted that, in absence of habits, both fertility rates and savings are quantitatively reduced by increasing aspirations in a way such that, as a consequence, capital accumulation results to be independent of aspirations. Indeed, if the old-period consumption is not stimulated via habits from the young-period consumption, greater aspirations are satisfied increasing the young-period consumption at the expense of not only fertility rates, but also of savings (and both reduces in an appropriate proportions such that the per capita capital is kept unaltered).

Finally, given that under a general neoclassical technology wages and interest rates do not depend directly on the aspirations parameter q, we may also conjecture that Results 4 and 5 hold in such a case as well. Indeed, in the next section we investigate the usual Cobb-Douglas production function and we show that, through extensive numerical simulations (since closed-form solutions are prevented), the analytical results obtained in this section hold also when both the wages and interest rate are endogenously determined.

2.4. Cobb-Douglas production function and neoclassical economic growth

In this section we study, in the light of a numerical exercise, the effect of greater aspirations on the optimal long-run per capita capital stock and thus on the neoclassical economic growth in the closed economy with production, by relaxing the assumption of fixed prices. In order to carry out our numerical simulations, we rely on the following functional form for production.

The production technology, involving labour and capital, is given by a constant returns to scale Cobb-Douglas production function, $Y_t = AK_t^{\alpha} L_t^{1-\alpha}$, where Y_t, K_t and $L_t = N_t$ are output, capital and the time-t labour input respectively, $A > 0$ represents a scale parameter and $\alpha \in (0,1)$ is the capital's share on total output. Defining $k_t := K_t / N_t$ and $y_t := Y_t / N_t$ as the per capita stock of capital and per capita output, respectively, the intensive form production function may be written as $y_t = Ak_t^{\alpha}$. Assuming total depreciation of physical capital at the end of each period and knowing that final output is treated at unit price, profit maximisation in a competitive context leads to the standard marginal conditions for capital and labour, respectively:

$$r_t = \alpha A k_t^{\alpha-1} - 1, \tag{21}$$

$$w_t = (1-\alpha) A k_t^{\alpha}. \tag{22}$$

Firstly, we examine the case of exogenous fertility, by recalling the system given by Eqs. (16) and (17). Therefore, after having solved (17) for the equilibrium value

$$h = \frac{\left[w_t(1+r^e{}_{t+1})\right]}{(1+r^e{}_{t+1}+\beta\pi)(1+\beta\pi(1-q))}$$

and substituting such an equilibrium in (16), and then exploiting (21) and (22), the dynamics of capital is determined by the following:

$$k_{t+1} = \frac{(1-\alpha)Ak_t{}^{\alpha}\pi\left[(1+\beta\pi(1-q))\gamma+\alpha Ak_{t+1}{}^{\alpha-1}\beta(1-q)\right]}{\phi(\alpha Ak_{t+1}{}^{\alpha-1}+\gamma\pi)((1+\beta\pi(1-q))(1+n)} \quad (23)$$

in the case of perfect foresight($r^e{}_{t+1} = r_{t+1}$), and

$$k_{t+1} = \frac{(1-\alpha)Ak_t{}^{\alpha}\pi\left[(1+\beta\pi(1-q))\gamma+\alpha Ak_t{}^{\alpha-1}\beta(1-q)\right]}{\phi(\alpha Ak_t{}^{\alpha-1}+\gamma\pi)((1+\beta\pi(1-q))(1+n)} \quad (24)$$

in the case of short-sight($r^e{}_{t+1} = r_t$).

With both types of expectations steady-state implies $k_{t+1} = k_t = k^*$, and thus the equilibrium points are the same.

Secondly, we examine the case with endogenous fertility. Starting from the system given by Eqs. (19) and (20) and following the same procedure of the previous case we have (for economy of space only the myopic case is displayed below)

$$k_{t+1} = \frac{m\pi\left[(1+\beta\pi(1-q))\gamma k_t+\alpha Ak_t{}^{\alpha}\beta(1-q)\right]}{\phi(\alpha Ak_t{}^{\alpha}+k_t\gamma\pi)(1-q))} \quad (25)$$

Unfortunately, closed-form solutions for the equilibrium per capita stock of capital are prevented for both cases, and then we resort to the numerical simulation.

The parameter set, chosen only for illustrative purposes,[8] is: *A*=5 (*A* is only a scale parameter), γ=0.3 (a value sufficiently low for the habits intensity, in order to show that our results significantly hold even under a mild presence of habits),[9] β=0.27 (the same illustrative value assumed by de la Croix-Michel, 2002, p. 62), π=1.00 (the maximum survival rate), α=0.33 (a standard capital share value); furthermore *m*=0.30 and φ=0.50 as regards the endogenous fertility case and *n*=0.75 as regards the exogenous fertility case. The following table 1 clearly displays how the long-run capital is significantly increased (reduced) by greater aspirations when fertility rate is endogenous (exogenous). Therefore, in sharp contrast with the conventional view, when the number of children is endogenously determined as argued by the recent economic literature, aspirations are always beneficial for the neoclassical economic growth, independently of whether they reduce or increase savings.

Table 1. The long-run per capita stock of capital in both cases with exogenous and endogenous fertility and fertility rate, for varying aspirations intensity.

q	k^*_f	*n**	*k**
0.10	0.205	1.75	0.358

[8] The extensive simulations performed with many parameter sets have provided the same results. Therefore, for economy of space, we present here only the results for one plausible parameter set.

[9] For comparison of values, we note that, for instance, Carroll et al. (2000) and Alonso-Carrera (2005) used γ=0.5.

0.40	0.237	1.36	0.226
0.50	0.261	1.20	0.181
0.60	0.320	1.01	0.135
0.70	0.385	0.80	0.096

Legend: k^*= long-run per capita capital with exogenous fertility; k^*_f= long-run per capita capital with endogenous fertility; n^*= long-run fertility rate.

3. Conclusions

This paper, motivated by the increasing literature on endogenous preferences as well as on endogenous fertility, has investigated the implications of the interaction of the endogenous determination of the number of children with habit and aspiration formation in an OLG model.

The proposed model provides a mechanism through which greater aspirations lead, in contrast with the previous literature, to higher savings in many parametric cases and mostly, always to a higher long-run income. These results hold under different contexts such as a small open economy and a closed economy either with a linear technology or with a standard Cobb-Douglas production function. As for such results, we highlight the crucial roles played by: (*i*) the endogenous choice of children, (*ii*) the interaction between aspirations and habits. The first one permitted individuals with greater aspirations to increase both consumption when young and savings thanks to a reduction in the number of children. The second one, through the mechanism described in the introduction, permitted to the aspirations to be a stimulus instead of an obstacle for long-run economic performance. Therefore this study may be considered as a contribution to the literature on the neoclassical economic growth which generalises some previous studies with endogenous preferences.

References

Abel, A., 1990. Asset prices under habit formation and catching up with the Joneses. *American Economic Review* 80, 38–42.

Abel, A., 2005. Optimal taxation when consumers have endogenous benchmark levels of consumption. *Review of Economic Studies* 75, 21–42.

Alonso-Carrera, J., Caballé, J., Raurich, X., 2004. Consumption externalities, habit formation and equilibrium efficiency. *Scandinavian Journal of Economics* 106, 231–51.

Alonso-Carrera, J., Caballé, J., Raurich, X., 2007. Aspirations, habit formation and bequest motive. *Economic Journal* 117, 813–836.

Artige, L., Camacho, C., de la Croix, D., 2004. Wealth breeds decline: reversals of leadership and consumption habits. *Journal of Economic Growth* 9, 423–449.

Becker, G.S., 1960. An economic analysis of fertility. In: Easterlin, R. (Ed.), *Demographic and Economic Change in Developed Countries*. Princeton University Press, Princeton.

Carroll, C., 2000. Solving consumption models with multiplicative habits. *Economics Letters* 68, 67–77.

Carroll, C., Overland, J., Weil, D., 2000. Saving and growth with habit formation. *American Economic Review* 90, 1–15.

de la Croix, D., 1996. The dynamics of bequeathed tastes. *Economics Letters* 53, 89–96.

de la Croix, D., Michel P. 1999. Optimal growth when tastes are inherited. *Journal of Economic Dynamics and Control* 23, 519–537.

de La Croix, D., Michel, P., 2002. *A theory of Economic Growth. Dynamics and Policy in Overlapping Generations*. Cambridge University Press, Cambridge.

Diamond, P.A., 1965. National debt in a neoclassical growth model. *American Economic Review* 55, 1126–1150.

Ferson, W.E., Constantinides, G.M., 1991. Habit persistence and durability in aggregate consumption: Empirical Test. *Journal of Financial Economics* 29, 199–240.

Eckstein, Z., Wolpin, K.I., 1985. Endogenous fertility and optimal population size. *Journal of Public Economics* 27, 93–106.

Galor, O., Weil, D.N., 1996. The gender gap, fertility, and growth. *American Economic Review* 86, 374–387.

Heaton, J., 1995. An empirical investigation of asset pricing with temporally dependent preference specifications. *Econometrica* 63, 681–717.

Lahiri, A., Puhakka, P., 1998. Habit persistence in overlapping generations economies under pure exchange. *Journal of Economic Theory* 78, 176–188.

Zhang, J., Zhang, J., 1998. Social security, intergenerational transfers, and endogenous growth. *Canadian Journal of Economics* 31, 1225–1241.

Wendner, R., 2002. Capital accumulation and habit formation, *Economics Bulletin* 4, 1–10.

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